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Measure Information Template

*California Building Energy Efficiency Standards
Revisions for July 2003 Adoption*

Cardinal Glass Industries

Proposed Measure: Replacement Fenestration

November 5, 2001

Description

This proposed measure would establish, as a mandatory measure, specific SHGC and U-factor requirements for replacement fenestration. This measure would apply to all existing homes in California when the existing frame and/or sash and glazing (windows, glass doors, skylights) is replaced. At this time, we have not developed our final recommendations regarding specific U-factor and SHGC criteria for replacement fenestration in California. We suggest, at a minimum, these values should be no greater than the prescriptive criteria in Package D, Section 151 [Tables 1-Z1 through Tables 1-Z16]. Another point of reference would be the standards for window replacement in the 2000 IECC (Section 502.2.5).

Benefits

Of the over 5,000,000 fenestration products sold in California each year, roughly 3,000,000 are installed in existing homes. The Standards currently set limited U-factor requirements for fenestration in certain additions and alterations; however, replacement fenestration is excluded from existing Standards. Extending the Standards to replacement fenestration could immediately double the potential energy and demand savings related to high performance fenestration.

Furthermore, adding SHGC and U-factor requirements for replacement fenestration would drastically increase occupant comfort, reduce equipment costs of any HVAC equipment replaced in connection with or following fenestration replacement, and reduce air pollutant emissions due to reduced energy consumption.

Environmental Impact

No adverse environmental impact expected.

Type of Change

Mandatory Measure: we propose that this measure be implemented as a “mandatory measure,” which would require all replacement windows installed in California to be subject to specific U-factor and SHGC energy performance criteria and the other mandatory requirements for new fenestration under the Standards.

Because this proposed change would extend the scope of the Standards to replacement fenestration, proper references for the treatment and performance of replacement fenestration is needed in several places. We suggest specific language be included in the Standards to implement this measure; any references in the ACM manual relating to fenestration should be updated to incorporate the adopted provisions for replacement fenestration; and we suggest that compliance forms be developed to implement the adopted replacement fenestration provisions.

Measure Availability and Cost

This measure would implement criteria for replacement fenestration products, just as the existing Standards prescribe standards for fenestration products in new homes. Technology to meet these requirements is readily available in California and has been on the market for several years. This market availability further substantiates that making the requirements for replacement fenestration a “mandatory measure” would not cause any undue burden in the marketplace. Several providers of energy efficient glass and window products are currently operating in California and can readily supply the products necessary to meet these requirements.

Useful Life, Persistence and Maintenance

This proposed measure would have no negative impact on the life, frequency of replacement, or maintenance procedures with regard to replacement fenestration. This measure is designed to ensure higher energy performance characteristics of fenestration products at the time they are replaced in existing homes. Given the long useful life of homes and fenestration products, there are very few opportunities to capture energy efficiency savings with regard to fenestration, which further emphasizes the need for this mandatory measure.

Performance Verification

As it is with new fenestration, performance verification for this measure would be accomplished through NFRC ratings.

Cost Effectiveness

If the replacement fenestration criteria are consistent with the standard design requirements for new homes, the life cycle cost analysis already performed for the Commission during the AB 970 standards update, which found the same or similar U-factor and SHGC criteria cost beneficial throughout California, would provide sufficient justification for this proposal. Furthermore, with replacement windows, much of the cost is in the installation of the window. When installation costs are included, the overall cost of the window replacement dwarfs the upgrade cost of high performance glazing.

Analysis Tools

Energy savings and peak electricity demand reductions attributable to this proposed measure can be estimated using various building simulation tools, such as MICROPAS and various DOE-2 based simulation tools.

Relationship to Other Measures

This proposed measure should be considered in conjunction with our proposals to revise the current compliance options for additions and to add a mandatory maximum SHGC requirement. The criteria ultimately adopted by the Commission should be consistent for all fenestration.

Bibliography and Other Research

The IECC contains similar mandatory prescriptive criteria for replacement fenestration. Information on the benefits of high performance replacement fenestration is available from the Efficient Windows Collaborative (www.efficientwindows.org). There is also a book entitled: "Residential Windows: A Guide to New Technologies and Energy Performance" that contains a wealth of information on high performance windows in new and existing homes.